Computational Fluid Dynamics Study of Channel Geometric Effect for Fischer-Tropsch Microchannel Reactor

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Conventional huge GTL processes use circulating fluidized bed reactor or slurry bubble column reactor which is not appropriate for offshore plant because of mechanical stability and size. Thus, small microchannel reactor is the only way to solve this problem. However, literature on modeling and simulation works on microchannel reactor is still limited and the design knowledge is largely based on experimental works and general engineering intuitions.

In this research, we used the computational fluid dynamics (CFD) for modeling the Fischer-Tropsch microchannel reactor. Especially, geometric effects of cooling channel and process channel were studied. Firstly, reaction was simulated numerically for obtaining reaction heat generation curve. Then, we assumed heat generation was fixed for process channel and varied the reactor geometry. Finally, heat flux and temperature gradient through the geometric differences were obtained for analyzing the heat transfer phenomena.